WHAT IS CLAIMED IS:

1.   A   computer   implemented   method   for   generating   a representation   of   structure   for   use   in   rendering   a synthesized image, comprising:

> establishing a selected viewing direction for the structure;
>
> determining distances from a reference surface to the structure for a plurality of points on the structure, the distances being a function of the selected viewing direction; and
>
> storing the distances as a representation.

2.   The   method   of   claim   1   wherein   the   steps   of establishing a selected viewing direction and determining distances from the reference surface to the structure are performed   each   for   a   plurality   of   selected   viewing directions.

3.   The method of claim 2 wherein determining distances includes determining distances with respect to a reference surface having a curvature.

4.   The method of claim 3 wherein determining distances includes calculating distances for a plurality of selected viewing directions uniformly distributed over a selected range and with respect to a reference surface of zero curvature.

5.   The method of claim 4 wherein determining distances for a reference surface of selected curvature comprises

interpolating distances obtained for the reference surface of zero curvature.

6.   The method of claim 1 wherein determining distances includes determining if a finite distance exists along the selected viewing direction, and wherein storing the representation includes storing the finite distances, and if a finite distance to the structure does not exist for a portion of the reference surface, storing an indication in the representation that such a finite distance does not exist for the portion from the reference surface to the structure along the selected viewing direction.

7.   The method of claim 1 wherein determining distances includes determining distances as being substantially parallel to the viewing direction.

8.   The method of claim 1 wherein determining distances includes determining distances as being a function of an angle of the viewing direction with respect to the reference surface.

9.   The method of claim 1 wherein determining distances includes determining distances with respect to a reference surface having a curvature.

10. The method of claim 1 wherein storing the representation includes storing distances as a function of coordinates indicative of a point on the reference surface.

11. The method of claim 1 wherein storing the representation includes storing distances as a function of a coordinate of the viewing direction.

12. The method of claim 11 wherein storing the representation includes storing distances as a function of two angular quantities of the viewing direction.

13. The method of claim 1 wherein determining distances includes accessing information of height distribution of the structure with zero curvature.

14. The method of claim 1 wherein storing the distances as a representation includes decomposing the representation as two lower dimensional representations.

15. The method of claim 14 wherein decomposing the representation comprises using a singular value decomposition algorithm.

16. The method of claim 15 wherein determining distances includes determining if a finite distance exists along the selected viewing direction, and wherein storing the representation includes storing the finite distances, and if a finite distance to the structure from the reference surface does not exist for a portion of the reference surface along the selected view direction, storing the corresponding distance of a maximum viewing direction having a finite distance.

17. The method of claim 16 and further comprising creating a map to record a maximum viewing direction having a finite distance for each point.

18. The method of claim 17 and further comprising decomposing the map using a singular value decomposition algorithm.

19. A computer implemented method for rendering a synthesized image, comprising:

        establishing a surface geometry of a structure to be synthesized;

        identifying a plurality of points on the surface geometry;

        establishing, for each point of the plurality of points, parameters related to a surface texture to be synthesized at the point, a synthesized viewing direction and a synthesized illumination direction; and

        using a representation of distances from a reference surface to a sample structure to modify characteristics of the point when rendered, the distances being a function of a selected viewing direction.

20. The method of claim 19 wherein establishing parameters includes establishing a local viewing curvature along the synthesized viewing direction.

21. The method of claim 19 wherein establishing parameters includes establishing a local illumination curvature along the synthesized illumination direction.

22. The method of claim 19 wherein establishing parameters includes interpolating parameters of a second plurality of points based on parameters established for the first-mentioned plurality of points.

23. The method of claim 19 wherein the representation includes finite distances from a reference surface to the sample structure along the selected viewing direction, and if a finite distance from the reference surface to the sample structure does not exist for a portion of the reference surface, an indication that such a finite distance does not exist for the portion from the reference surface to the structure along the selected viewing direction, and wherein using the representation includes rendering the point if a finite distance exists and not rendering the point if a finite distance does not exist.

24. The method of claim 23 wherein using the representation includes calculating an offset using the corresponding distance of each point along the viewing direction to identify an actual texture coordinate from the reference surface.

25. The method of claim 24 wherein using the representation includes determining if a point is occluded by another portion of the synthesized structure for the synthesized illumination direction.

26. The method of claim 25 wherein using the representation includes modifying characteristics of the point when rendered to include shadowing, if the point is occluded by another portion of the synthesized structure.